

AMENDMENTS TO THE CLAIMS:

The listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended) A process for recovering a target metal from an oxidised metalliferous material comprising the steps of:
 - in an acid generation stage, adding sulfuric acid to a solution comprising ~~a metal halide~~ calcium chloride to generate an acidic aqueous ~~halide~~ chloride solution;
 - in a leaching stage that is separate to the acid generation stage, leaching the oxidised metalliferous material with the acidic aqueous ~~halide~~ chloride solution to leach the target metal into solution;
 - passing the solution from the leaching stage to a target metal recovery stage in which the target metal is recovered from the solution whilst the ~~metal halide~~ calcium chloride is retained in solution; and
 - returning the solution with the ~~metal halide~~ calcium chloride therein from the target metal recovery stage to the acid generation stage[[.]] ,
wherein total chloride concentration is in the range of 6 to 8M, and at least 30 g/l of calcium chloride (CaCl₂) is maintained in the process solution.
2. (Currently Amended) A process as claimed in claim 1 wherein the ~~metal of the metal halide solution is one that~~ calcium forms a precipitate with the sulfate anion of the sulfuric acid such that, with the generation of the acidic aqueous ~~halide~~ chloride solution in the acid generation stage, a ~~hydrohalous~~ hydrochloric acid forms together with a calcium sulfate precipitate of the metal sulfate.
3. (Cancelled)
4. (Cancelled)

5. (Currently Amended) A process as claimed in claim 1 wherein, when the oxidised metalliferous material includes precious metal(s), ~~the halide of the metal halide~~ calcium chloride solution ~~then~~ further comprises ~~chloride~~ and bromide.

6. (Previously Presented) A process as claimed in claim 1 wherein the acid generation stage is defined by a second leaching stage in which both acid generation, and secondary leaching of the oxidised metalliferous material take place.

7. (Original) A process as claimed in claim 6 wherein the sulfuric acid is added directly to the second leaching stage.

8. (Currently Amended) A process as claimed in claim 7 wherein the ~~metal~~ calcium of the ~~metal halide~~ calcium chloride solution ~~is one that~~ forms a precipitate with the sulfate anion of the sulfuric acid such that the acidic aqueous ~~halide~~ chloride solution generated is ~~a hydrohalous hydrochloric acid, with a~~ calcium sulfate precipitate ~~of the metal sulfate~~ simultaneously forming and being removed with the second leached solids to be discarded as residue.

9. (Currently Amended) A process as claimed in claim 1 wherein the leaching stage comprises first and second leaching stages that operate in a counter-current configuration, whereby:

- the oxidised metalliferous material is added to the first leaching stage to contact the solution and leach target metal into solution; and

- the solution from the first leaching stage is separated from first leached solids and passed to the target metal recovery stage; and

- the first leached solids are passed to the second leaching stage to be mixed with the acidic aqueous ~~halide~~ chloride solution generated in the acid generation stage; and

- the solution from the second leaching stage is separated from second leached solids and passed to the first leaching stage, and the second leached solids are discarded as residue.

10. (Currently Amended) A process as claimed in claim 9 wherein a portion of the solution from the second leaching stage is not passed to the first leaching stage but is diverted to the acid

generation stage whereby, after the sulfuric acid is added to this solution, the acidic aqueous ~~halide chloride~~ solution is then generated for feeding to the second leaching stage to mix with the first leached solids.

11. (Currently Amended) A process as claimed in claim 9 wherein the metal of the ~~metal halide solution is one that~~ calcium forms a precipitate with the sulfate anion of the sulfuric acid such that, the acidic aqueous ~~halide chloride~~ solution generated in the acid generation stage is a ~~hydrohalous~~ hydrochloric acid, and such that a calcium sulfate precipitate ~~of the metal with sulfate anion~~ forms.

12. (Currently Amended) A process as claimed in claim 11 wherein, prior to passing the acidic aqueous ~~halide chloride~~ solution to the second leaching stage, any calcium sulfate precipitate of ~~the metal formed with the sulfate anion~~ is removed.

13. (Previously Presented) A process as claimed in claim 1 wherein the target metal recovery stage comprises a precipitation stage in which a precipitate of the target metal is formed by adding a precipitation agent to the solution.

14. (Currently Amended) A process as claimed in claim 13 wherein the precipitation agent can include ~~a metal that is the metal of the metal halide solution~~ calcium, such that addition of the precipitation agent can maintain a desired concentration of ~~that metal~~ calcium in solution.

15. (Currently Amended) A process as claimed in claim 14 wherein, when ~~the metal~~ calcium of the ~~metal halide~~ calcium chloride solution forms a precipitate with the sulfate anion and is removed in the acid generation stage, a corresponding amount of ~~that metal~~ calcium is added in the target metal recovery stage to maintain the desired concentration.

16. (Previously Presented) A process as claimed in claim 13 wherein the oxidised metalliferous material comprises more than one target metal, and a respective precipitation stage is provided for each target metal.

17. (Previously Presented) A process as claimed in claim 13 wherein the oxidised metalliferous material includes iron, whereby a proportion of that iron is leached into solution in the leaching stage, with at least a proportion of the leached iron then being precipitated in an iron

precipitation stage as ferric oxide through the addition of calcium carbonate as the precipitation agent.

18. (Original) A process as claimed in claim 17 wherein the oxidised metalliferous material has sufficient residence time in the leaching stage such that leached iron can be oxidised through to haematite.

19. (Currently Amended) A process as claimed in claim 13 wherein, when the target metal includes copper, the target precious metal is precipitated in a copper precipitation stage by adding calcium carbonate as the precipitation agent.

20. (Previously Presented) A process as claimed in claim 13 wherein, when the target metal includes a precious metal, the precious metal is precipitated in a precious metal precipitation stage by adding NaSH as the precipitation agent.

21. (Previously Presented) A process as claimed in claim 13 wherein, when the target metal includes nickel and/or cobalt, the nickel and/or cobalt is precipitated in a nickel/cobalt precipitation stage by adding calcium hydroxide as the precipitation agent.

22. (Previously Presented) A process as claimed in claim 13 wherein, when the target metal includes magnesium, the magnesium is precipitated in a magnesium precipitation stage by adding calcium hydroxide as the precipitation agent.

23. (Previously Presented) A process as claimed in claim 22 wherein the calcium hydroxide is slaked lime.

24. (Previously Presented) A process as claimed in claim 1 wherein the target metal recovery stage comprises an electrolytic recovery stage, whereby the solution from the leaching stage is passed to one or more electrolysis cells for metal recovery by electro-deposition.

25. (Original) A process as claimed in claim 24 wherein the oxidised metalliferous material comprises more than one target metal, and a respective electrolytic recovery stage is provided for each target metal.

26. Claim 26 (Previously Presented): A process as claimed in Claim 1 wherein the sulfuric acid is added to the acid generation stage to achieve a pH in the range 0 to 1 and a solution Eh of ~ 600mV.

27. (Previously Presented) A process as claimed in claim 1 wherein the temperature of the solution in the leaching stage is in the range 85 – 95°C.

28. (Currently Amended) A process as claimed in claim ~~4~~ 37 or 38 wherein, when the halide is chloride, total chloride concentration is in the range of 6 to 8M.

29. (Currently Amended) A process as claimed in claim ~~4~~ 37 or 38 wherein, when the halide is chloride and the solution metal is calcium, at least ~~30~~ 4 ~~30~~ g/L of CaCl₂ is maintained in the process solution.

30. (Currently Amended) A process for leaching a target metal from an oxidised metalliferous material, the process comprising first and second leaching stages in which an acidic aqueous halide solution generated from sulfuric acid and used for leaching the target metal into solution passes counter-currently therethrough, wherein the acid generated from sulfuric acid is added to or formed in the second leaching stage, and the oxidised metalliferous material is fed to the first leaching stage and wherein the solution comprises a total chloride concentration in the range of 6 to 8M and at least 30 g/L of CaCl₂, and contacted with a recycle of residual acid in solution from the second leaching stage to leach the material and produce first leached solids, and wherein the solution is separated from the first leached solids and may be passed to target metal recovery, whereas the first leached solids are passed to the second leaching stage for contact with the acidic aqueous halide solution for further leaching of the solids whilst producing the residual acid recycle solution.

31. (Original) A process as claimed in claim 30 wherein the acid generated from sulfuric acid is generated in a separate stage from the second leaching stage prior to being added thereto, or is generated in the second leaching stage.

32. (Previously Presented) A process as claimed in claim 30 wherein the oxidised metalliferous material includes iron such that a proportion of iron is leached into solution in the

first leaching stage and precipitated as ferric oxide, with the ferric oxide precipitate passing with the solids to the second leaching stage.

33. (Cancelled)
34. (Withdrawn) A target metal recovered by the process of claim 1.
35. (Withdrawn) A target metal recovered by the process of claim 30.
36. (Previously Presented) A process as claimed in claim 21 wherein the calcium hydroxide is slaked lime.
37. (New) A process for recovering a target metal from an oxidised metalliferous material comprising the steps of:
 - in an acid generation stage, adding sulfuric acid to a solution comprising a metal halide to generate an acidic aqueous halide solution;
 - in a first leaching stage, that is separate to the acid generation stage, leaching the oxidised metalliferous material with the acidic aqueous halide solution to leach the target metal into solution;
 - separating the solution from the first leaching stage from first leached solids and passing the solution to a target metal recovery stage in which the target metal is recovered from the solution whilst the metal halide is retained in solution;
 - returning the solution with the metal halide therein from the target metal recovery stage to the acid generation stage;
 - passing the first leached solids from the first leaching stage to a second leaching stage in which the solids are mixed with the acidic aqueous halide solution; and
 - separating the second leached solids from the solution of the second leaching stage, passing a portion of this solution to the first leaching stage and discarding the second leached solids as residue;
 - and passing the remaining portion of the solution of the second leaching stage to the acid generation stage whereby, after the sulfuric acid is added to this solution, the acidic aqueous halide solution is then generated for feeding to the second leaching stage.
38. (New) A process for recovering a target metal from an oxidised metalliferous material

comprising the steps of:

- in an acid generation stage, adding sulfuric acid to a solution comprising a metal halide to generate an acidic aqueous halide solution;
- in a leaching stage that is separate to the acid generation stage, leaching the oxidised metalliferous material with the acidic aqueous halide solution to leach the target metal into solution;
- passing the solution from the leaching stage to a target metal recovery stage comprising a precipitation stage in which a precipitate of the target metal is formed by adding a precipitation agent to the solution, whereby the precipitation agent can include a metal that is the metal of the metal halide solution, such that addition of the precipitation agent can maintain a desired concentration of that metal in solution, to thereby recover the target metal from the solution whilst the metal halide is retained in solution; and
- returning the solution with the metal halide therein from the target metal recovery stage to the acid generation stage,

wherein, when the metal of the metal halide solution forms a precipitate with the sulfate anion and is removed in the acid generation stage, a corresponding amount of that metal is added in the target metal recovery stage to maintain the desired concentration.